The science behind supplementary feeding

John Roche, Principal Consultant,
Down to Earth Advice

Why farmers feed supplements?

Surveyed farmers in Ireland and New Zealand

Down To Earth Advice Ltd
Science into Practice

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Many reasons, but grouped into:

1. *Prevent BCS loss in early lactation (repro);*
2. *'ease of management';*
3. *'cow-centric' judgements;*
4. *Increase MS production to increase profit.*

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A focus of our research…

J. Dairy Sci. 96:5811–5825
http://dx.doi.org/10.3168/jds.2013-6600

Calving body condition score affects indicators of health in grazing dairy cows

J. Dairy Sci. 98:1019–1032
http://dx.doi.org/10.3168/jds.2014-8584

Body condition score at calving affects systemic and hepatic transcriptome indicators of inflammation and nutrient metabolism in grazing dairy cows

J. Dairy Sci. 92:5769–5801
doi:10.3168/jds.2009-2431

Invited review: Body condition score and its association with dairy cow productivity, health, and welfare

J. R. Roche,*[1] N. C. Friggens,† J. K. Kay,* M. W. Fisher,‡ K. J. Stafford,§ and D. P. Berry#
*DairyNZ Ltd., PO Box 3221, Hamilton, New Zealand
†UMR INRA-AgroParisTech Model Syst. Nutr. Rum., 16 rue Claude Bernard, 75231 Paris, France
‡Kotare Bioethics, PO Box 2484, Stortford Lodge, Hastings 4153, New Zealand
§Institute of Veterinary Animal and Biomedical Sciences, Massey University, Palmerston North, New Zealand
#Teagasc, Moorepark Dairy Production Research Centre, Fermoy, Co. Cork, Ireland

tissue transcriptome regulators of metabolism and inflammation in grazing dairy cows during the transition period

M. Vailati-Riboni,* M. Kanwal,* O. Bulgari,*† S. Meier,‡ N. V. Priest,‡ C. R. Burke,‡ J. K. Kay,‡ S. McDougall,§ M. D. Mitchell,# C. G. Walker,‡ M. Crookenden,‡ A. Heiser,‖ J. R. Roche,‡ and J. J. Loor*[1]

…ding level on production, reproduction, and health …rameters in pasture-based transition dairy cows

…Roche,*[1] S. Meier,* A. Heiser,† M. D. Mitchell,‡ C. G. Walker,§ M. A. Crookenden,§ M. Vailati Riboni,# …Loor,# and J. K. Kay*

J. Dairy Sci. 100:1720–1738
https://doi.org/10.3168/jds.2016-11591

Strategies to gain body condition score in pasture-based dairy cows during late lactation and the far-off nonlactating period and their interaction with close-up dry matter intake

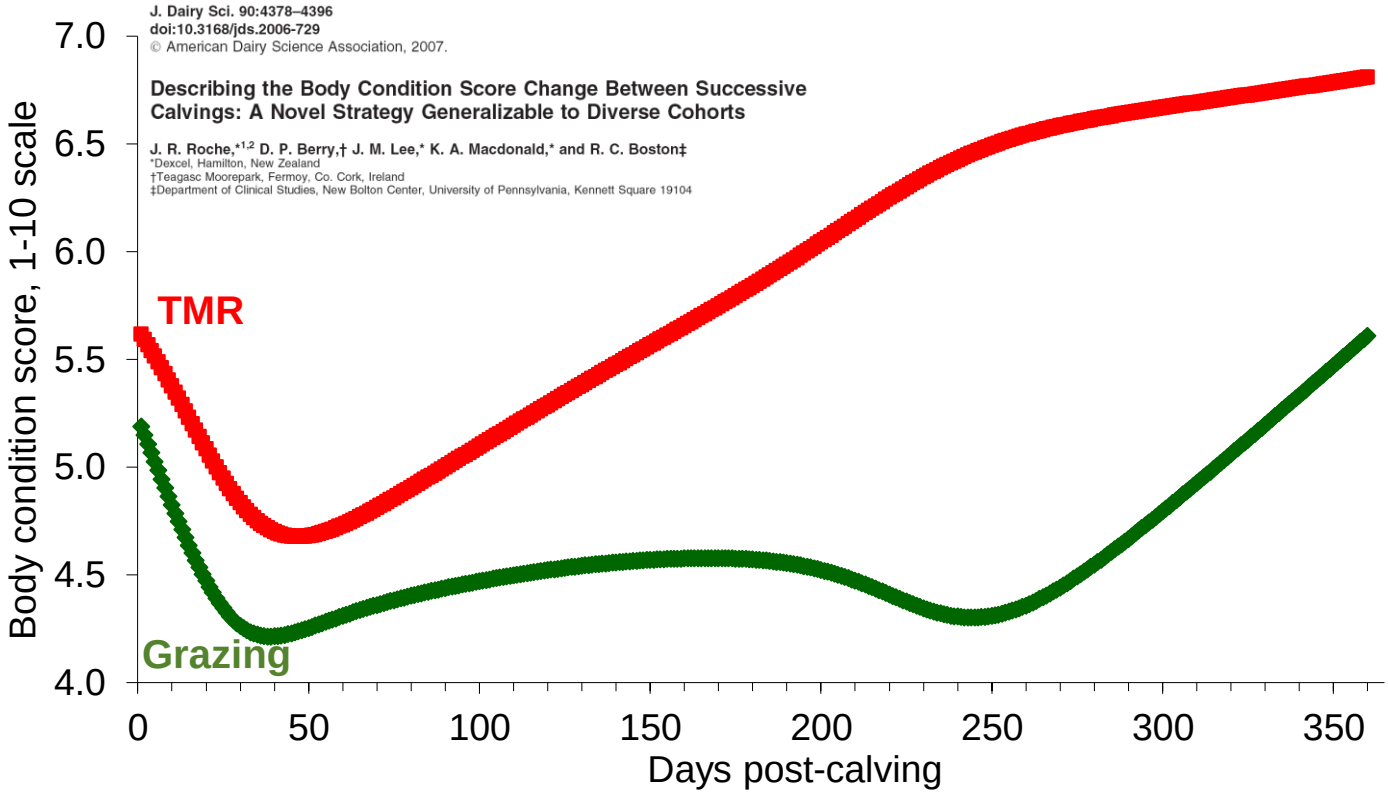
J. R. Roche,*[1] A. Heiser,† M. D. Mitchell,‡ M. A. Crookenden,§ C. G. Walker,§ J. K. Kay,* M. Vailati … J. J. Loor,# and S. Meier*

J. Dairy Sci. 100:1–17
https://doi.org/10.3168/jds.2016-11790

Far-off and close-up dry matter intake modulate indicators of immunometabolic adaptations to lactation in subcutaneous adipose tissue of pasture-based transition dairy cows

M. Vailati-Riboni,* G. Farina,*† F. Batistel,* A. Heiser,‡ M. D. Mitchell,§ M. A. Crookenden,# C. G. Walker,# J. K. Kay,‖ S. Meier,‖ J. R. Roche,‖ and J. J. Loor*[1]

When comparing BCS of cows in TMR and grazing systems…



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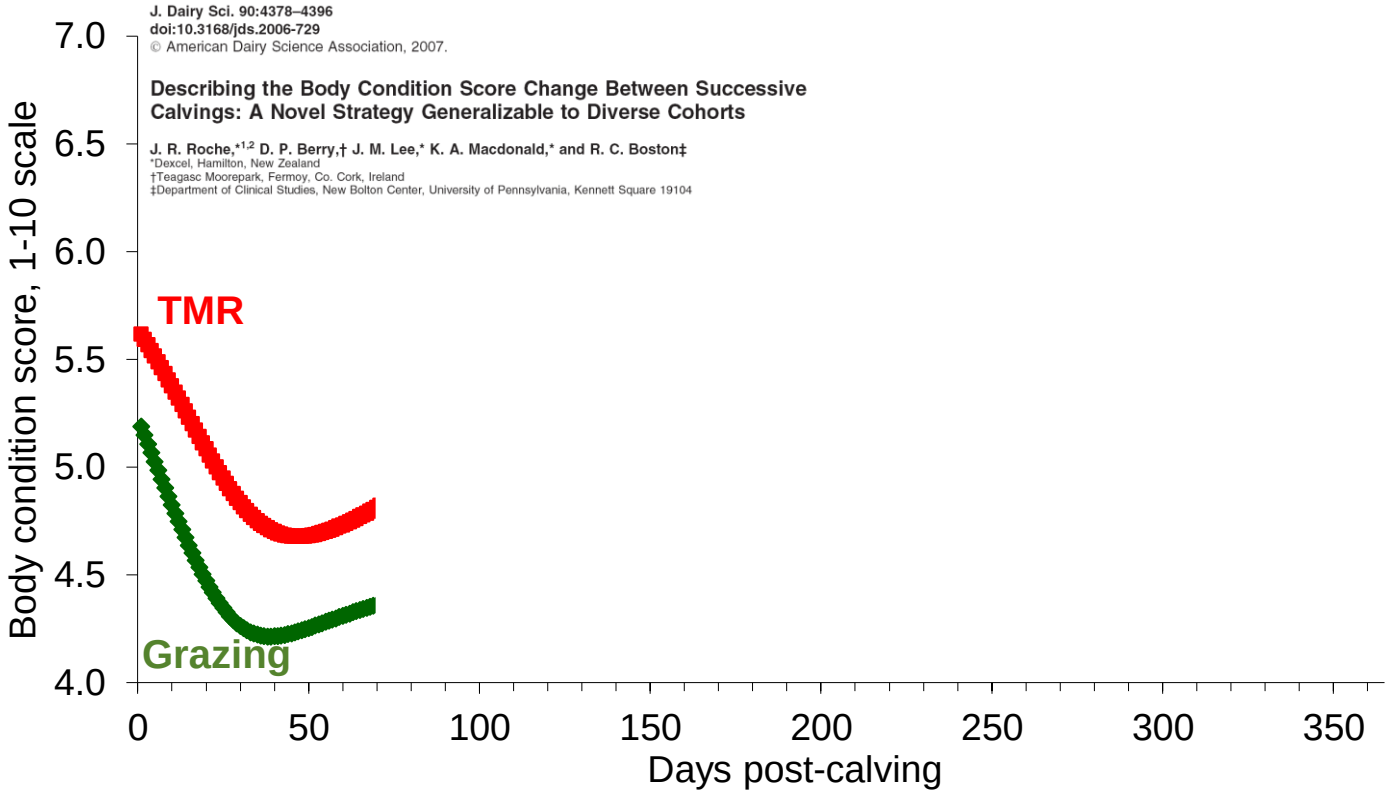

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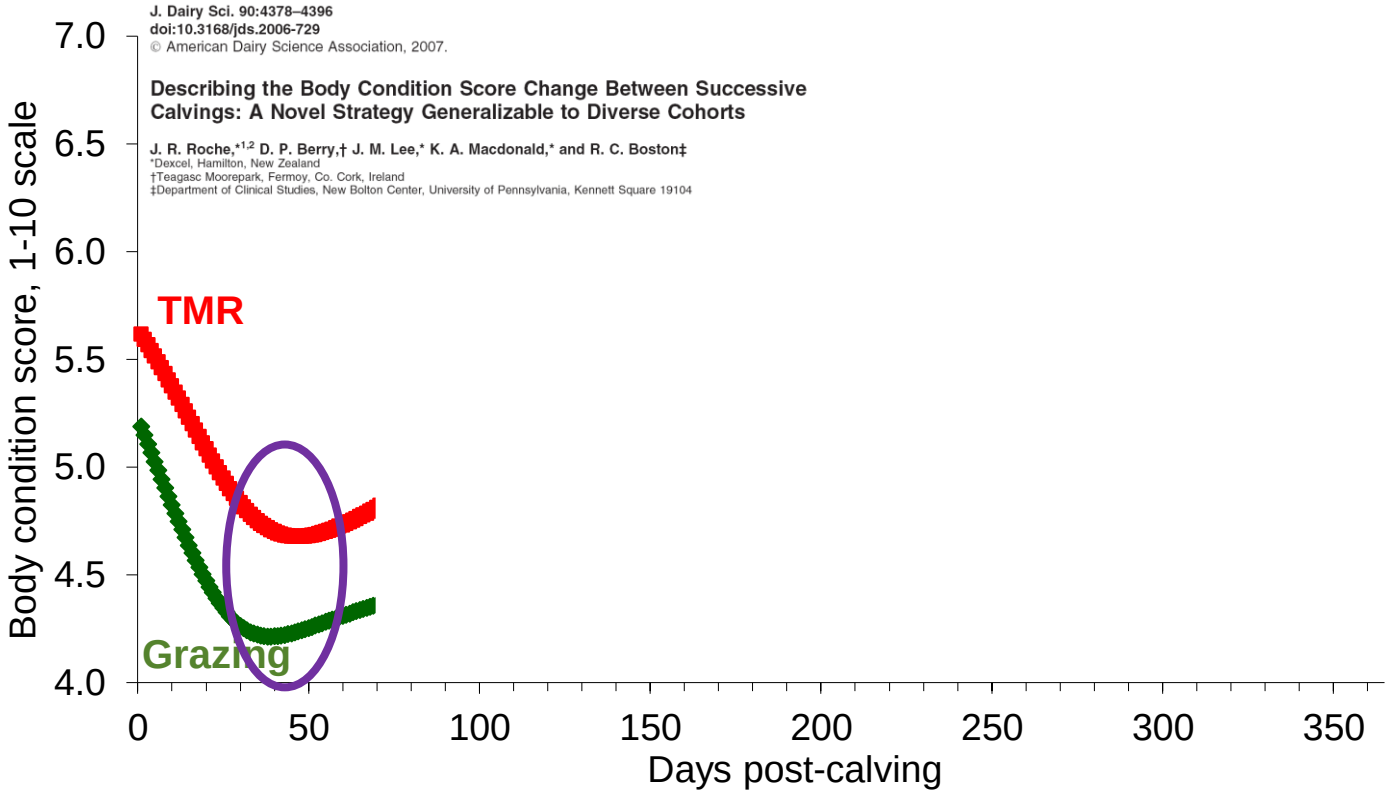

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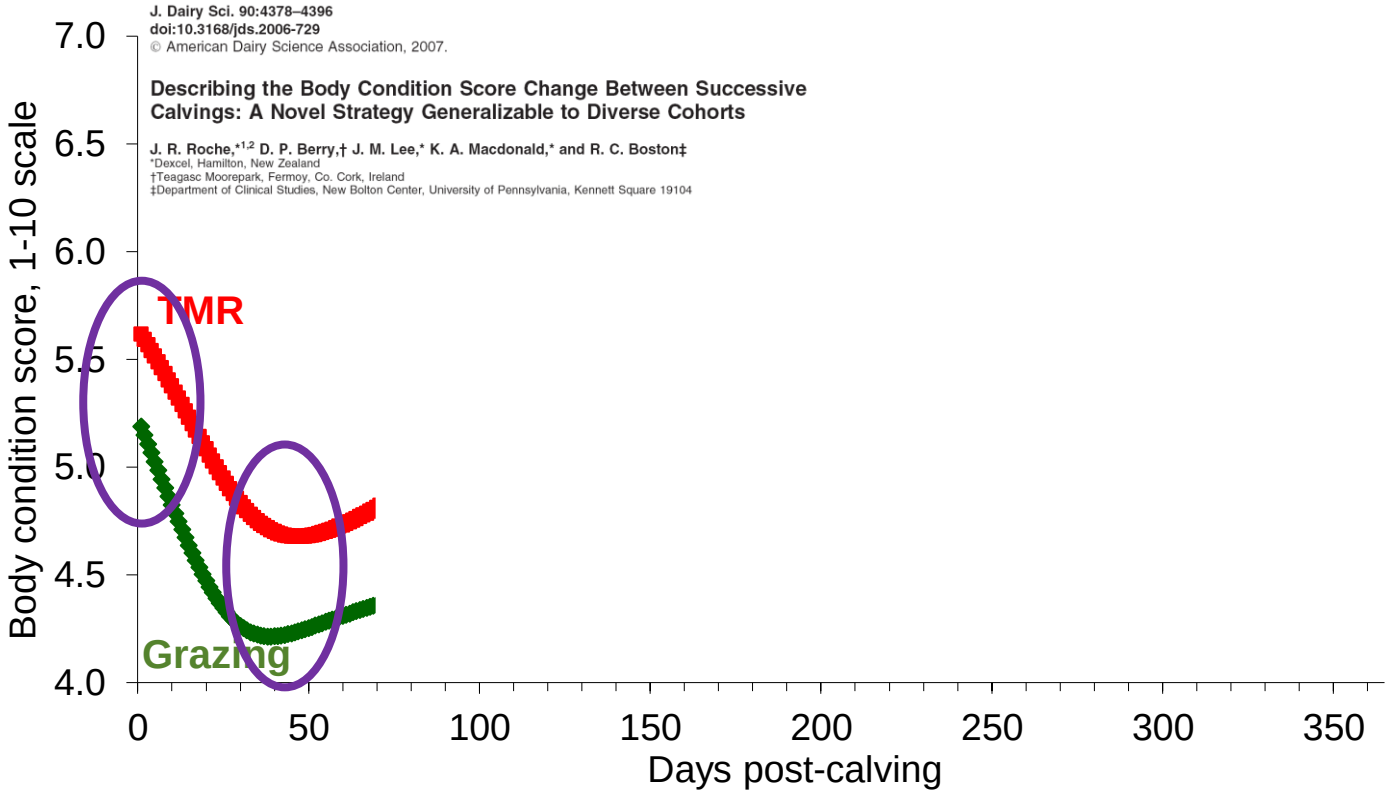

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Science into Practice

J. Dairy Sci. 101:3433–3446
https://doi.org/10.3168/jds.2016-12421

Effect of altering the type of dietary carbohydrate early postpartum on reproductive performance and milk production in pasture-grazed dairy cows

S. McDougall,*[1] S. Leane,† S. T. Butler,† J. R. Roche,‡ and C. R. Burke‡
*Cognosco, Anexa FVC, Morrinsville, New Zealand, 3300
†Animal and Grassland Research and Innovation Centre, Teagasc, Moorepark, Fermoy, Co. Cork, Ireland, P61 C996
‡DairyNZ Limited, Hamilton, New Zealand 3240

Table 4. The proportion of cows submitted for AI in the first 3 wk after the commencement of the seasonal breeding program, conceiving to first AI, pregnant after 3 or 6 wk, and pregnant by the end of a seasonal breeding period for cows assigned to a diet designed to be high or low in NSC during the first 4 to 5 wk of lactation

		High starch		Low starch		*P*-value				
Variable	Herd	Mean	SEM	Mean	SEM	Diet	Herd	Diet × herd	Age	DIM PSM[1]
SubD21[2]	1	0.79	0.06	0.89	0.07	0.216	0.658	0.137	0.004	0.001
	2	0.85	0.06	0.88	0.04					
	3	0.86	0.05	0.82	0.04					
ConS1[3]	1	0.43[b]	0.50	0.61[a]	0.79	0.238	0.059	0.078		0.025
	2	0.65	1.07	0.61	0.80					
	3	0.58	0.57	0.80	0.54					
Preg 3wk[4]	1	0.38	0.31	0.57	0.19	0.111	0.089	0.114	0.030	0.004
	2	0.58	0.21	0.57	0.19					
	3	0.52	0.07	0.52	0.07					
Preg 6wk[5]	1	0.67[b]	0.06	0.85[a]	0.05	0.043	0.369	0.058	0.003	0.002
	2	0.82	0.03	0.81	0.03					
	3	0.77	0.04	0.80	0.04					
Final preg[6]	1	0.85[b]	0.05	0.97[a]	0.03	0.174	0.094	0.026	0.002	0.024
	2	0.95	0.05	0.93	0.04					
	3	0.91	0.03	0.89	0.04					

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	Farm	High Starch	Low Starch
6-wk ICR	1		
	2		
	3		

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	3	77	80

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	Farm	High Starch	Low Starch
6-wk ICR	1	67	85
	2	82	81
	3	77	80
Empty	1	15	3
	2	5	7
	3	9	11

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	3	77	80
Empty	1	15	3
	2	5	7
	3	9	11

J. Dairy Sci. 101:1–12
https://doi.org/10.3168/jds.2018-14894

The effect of exogenous glucose infusion on early embryonic development in lactating dairy cows

S. Leane,*† M. M. Herlihy,* F. Curran,*† J. Kenneally,* N. Forde,†‡ C. A. Simintiras,§ R. G. Sturmey,§ M. C. Lucy,# P. Lonergan,† and S. T. Butler*[1]

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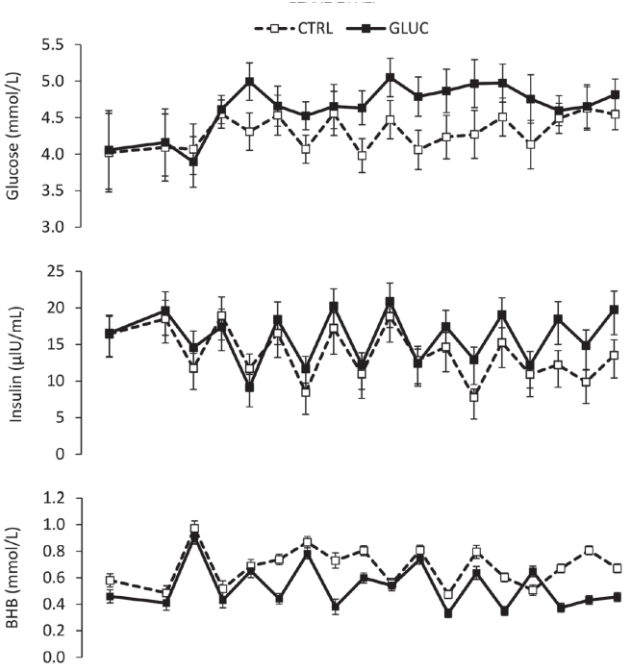

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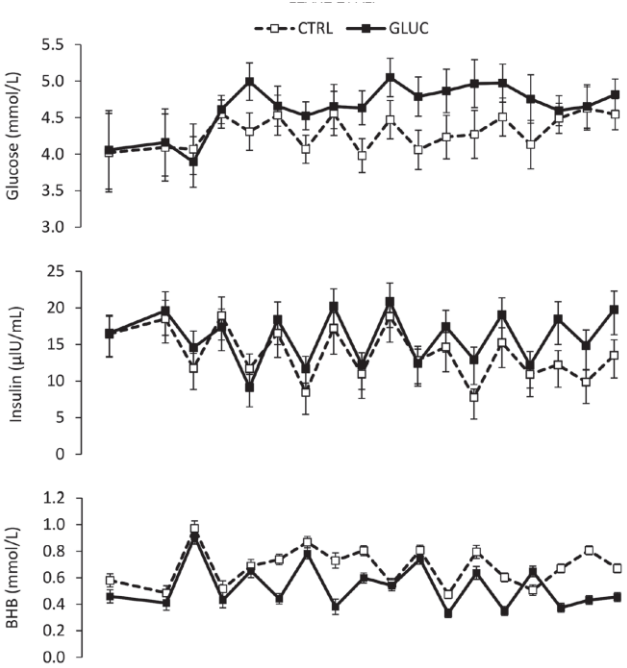

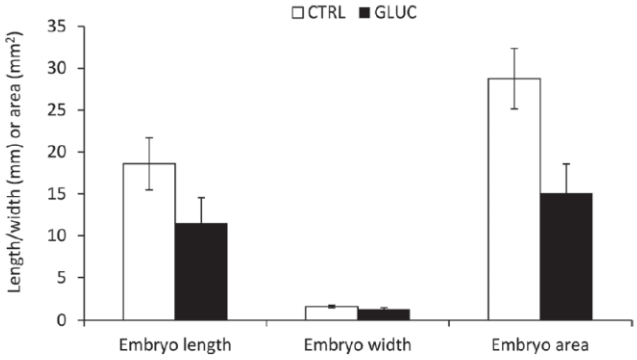

Figure 5. Mean dimensions of conceptuses recovered from uterine flushings on d 14. The GLUC cows received intravenous glucose infusion (750 g/d; 78 mL/h of 40% glucose) at a constant rate from 0 h until 156 h; the control (CTRL) cows received intravenous infusion of saline (78 mL/h of 0.9% saline solution). Data represent 11 animals and 112 embryos in total. Embryo length ($P = 0.025$), embryo width ($P = 0.007$), and embryo area ($P = 0.001$) were greater in CTRL cows than in GLUC cows. Vertical bars indicate SEM.

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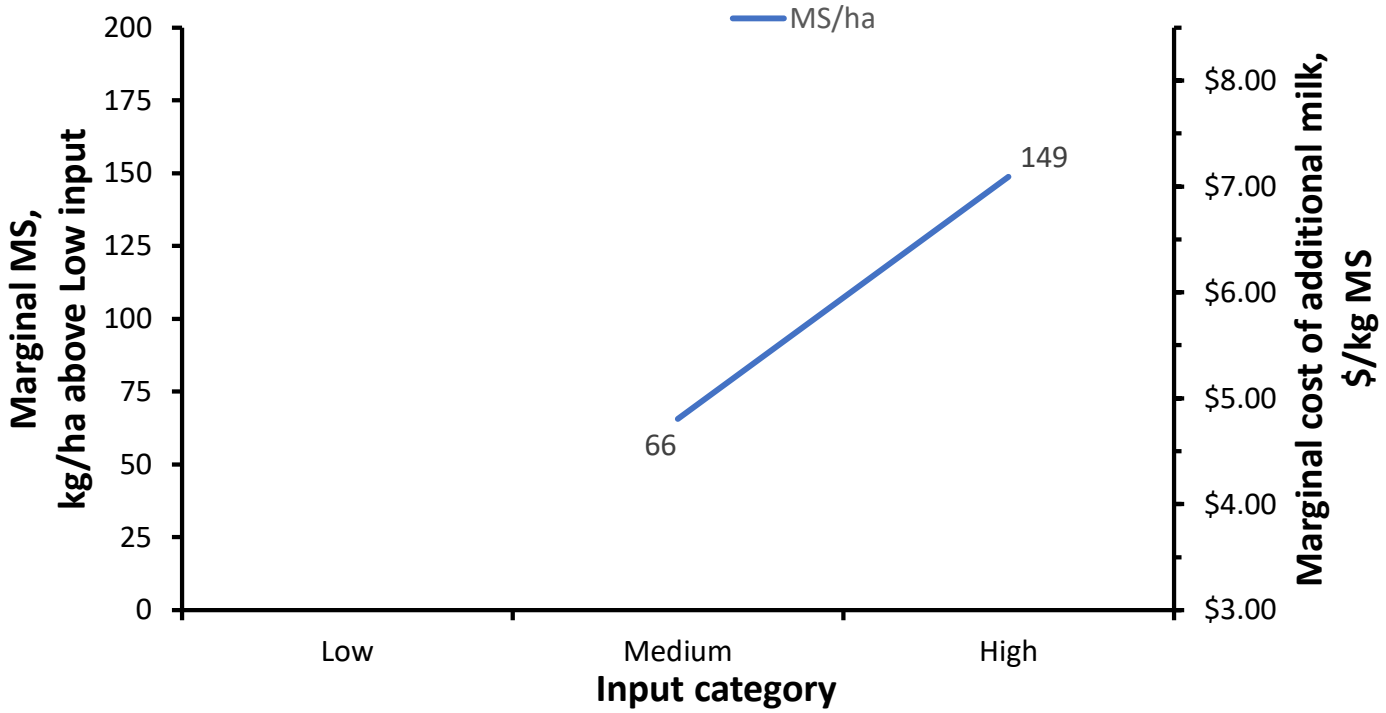
JAE Journal of Agricultural Economics

Journal of Agricultural Economics
doi: 10.1111/1477-9552.12261

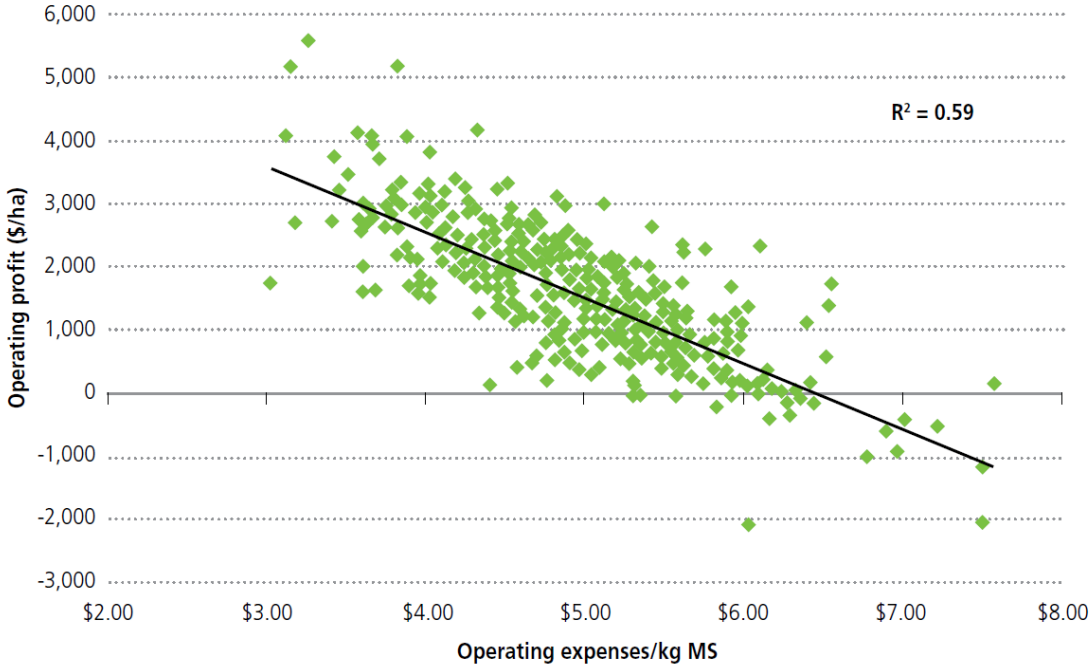
Higher Intensity, Higher Profit? Empirical Evidence from Dairy Farming in New Zealand

Wanglin Ma, Alan Renwick and Kathryn Bicknell[1]



Average of 3 years – 2011, 2012, 2013

2014-15 NZ Operating Profit ($/ha) vs Operating Expenses ($/kg MS)



Source: DairyNZ Economics Group

They couldn't afford me lad. And anyway different farmers need to make own decisions on what they classify as marginal milk because on my books profit no matter how big or how small is still profit 👍

23/11/18, 11:11 AM

1 Like

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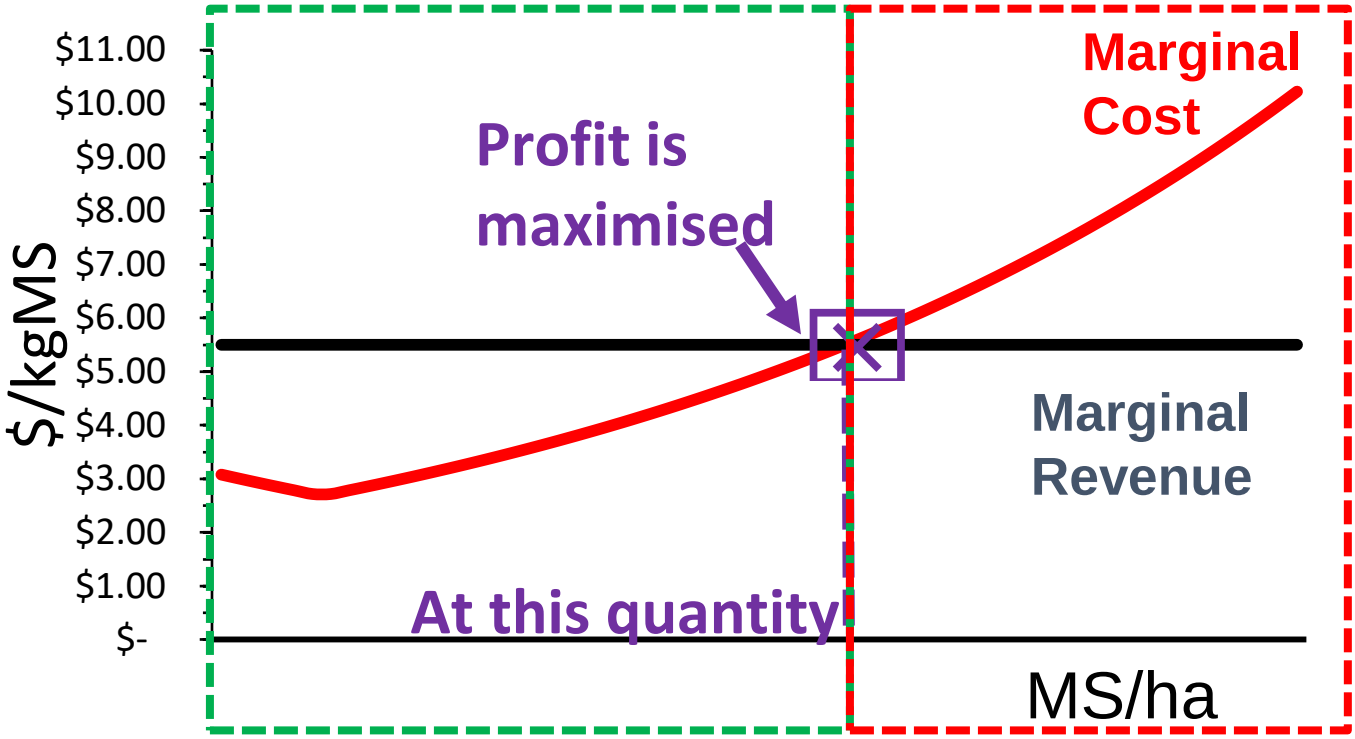
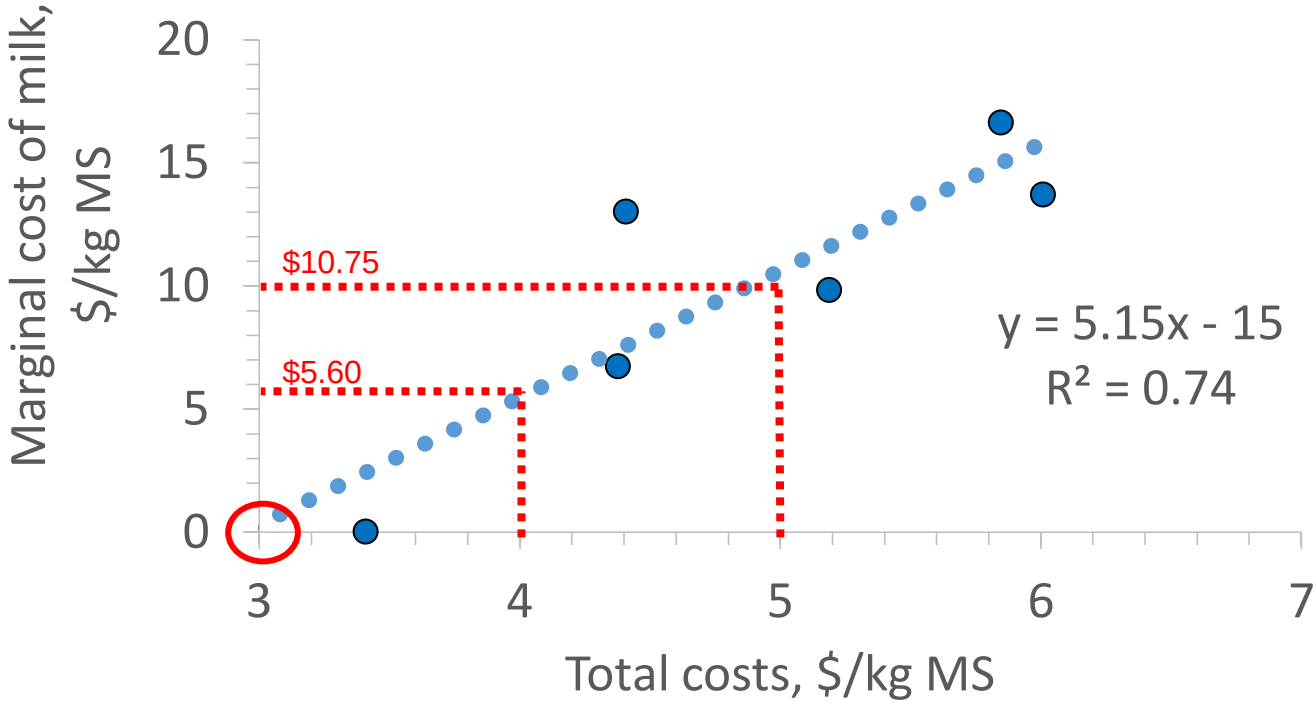
Marginal cost-marginal benefit



Marginal milk is the additional (or reduced) milk when you make a system change.

Average cost hides marginal losses



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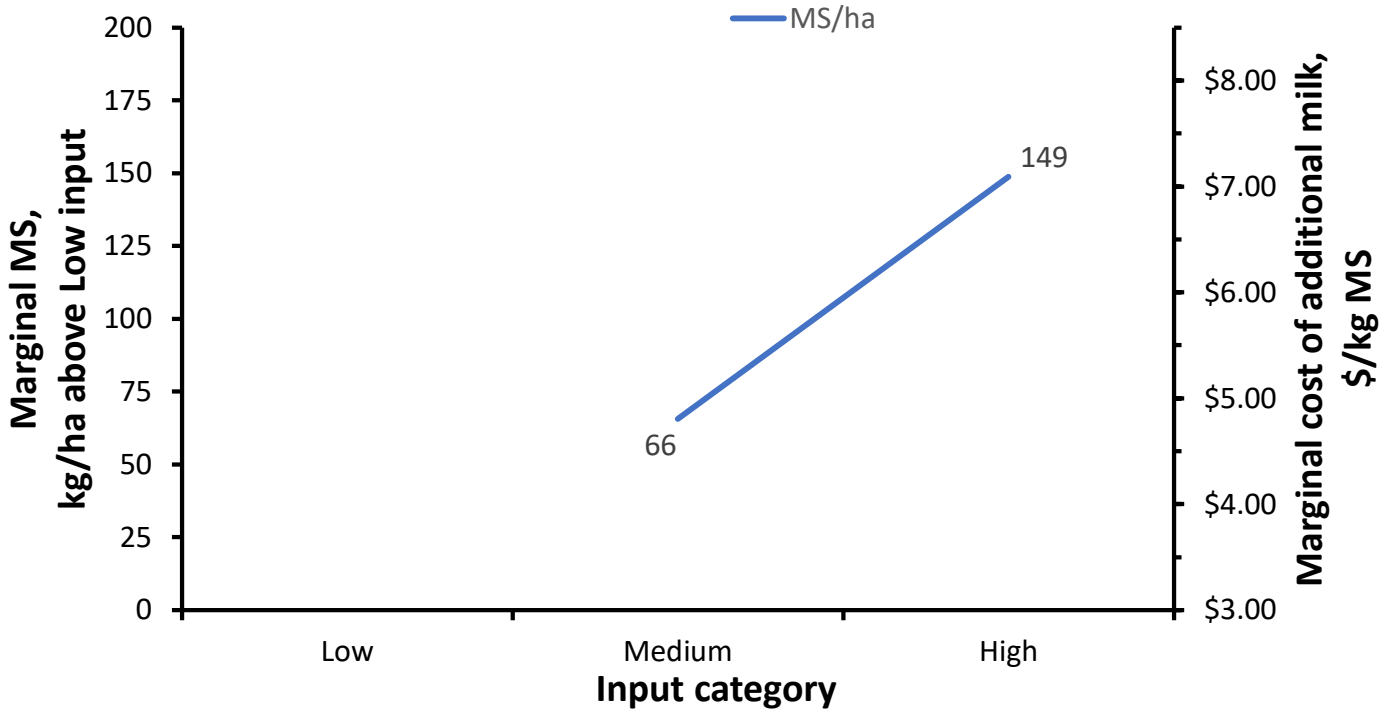

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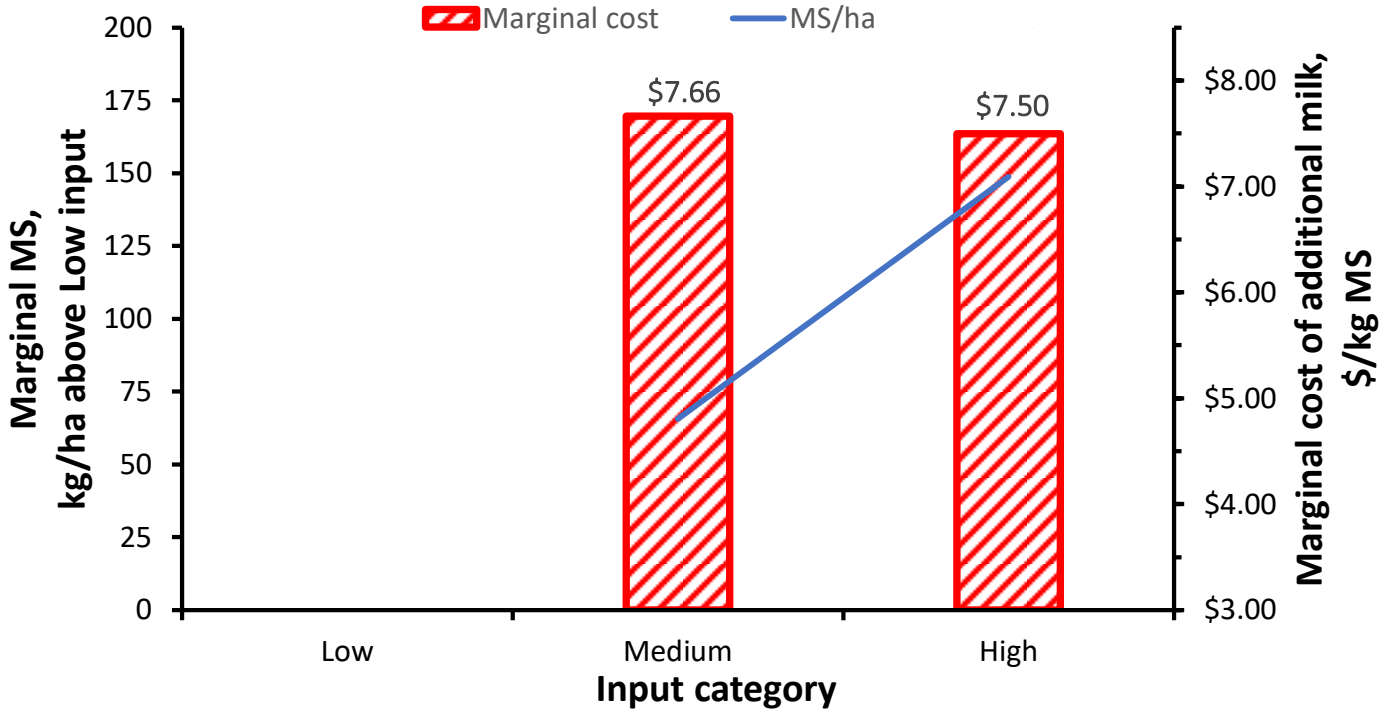

Average of 3 years – 2011, 2012, 2013

J. Dairy Sci. 100:6602–6619
https://doi.org/10.3168/jds.2016-12497

Production and economic responses to intensification of pasture-based dairy production systems

K. A. Macdonald, J. W. Penno,[1] J. A. S. Lancaster, A. M. Bryant, J. M. Kidd,[2] and J. R. Roche[3]
DairyNZ, Private Bag 3221, Hamilton, New Zealand 3240

Stocking rate	3.35 cows/ha	4.41 cows/ha	4.41 cows/ha	4.41 cows/ha
Supplements, t DM/cow	-	-	1.3	1.1
CSR, kg Lwt/t feed DM	86	113	82	84
MS/ha, kg	1,199	1,175	1,745	1,584
MS/cow, kg	357	267	396	359
Op profit/ha	2,544	1,845	1,390	1,812

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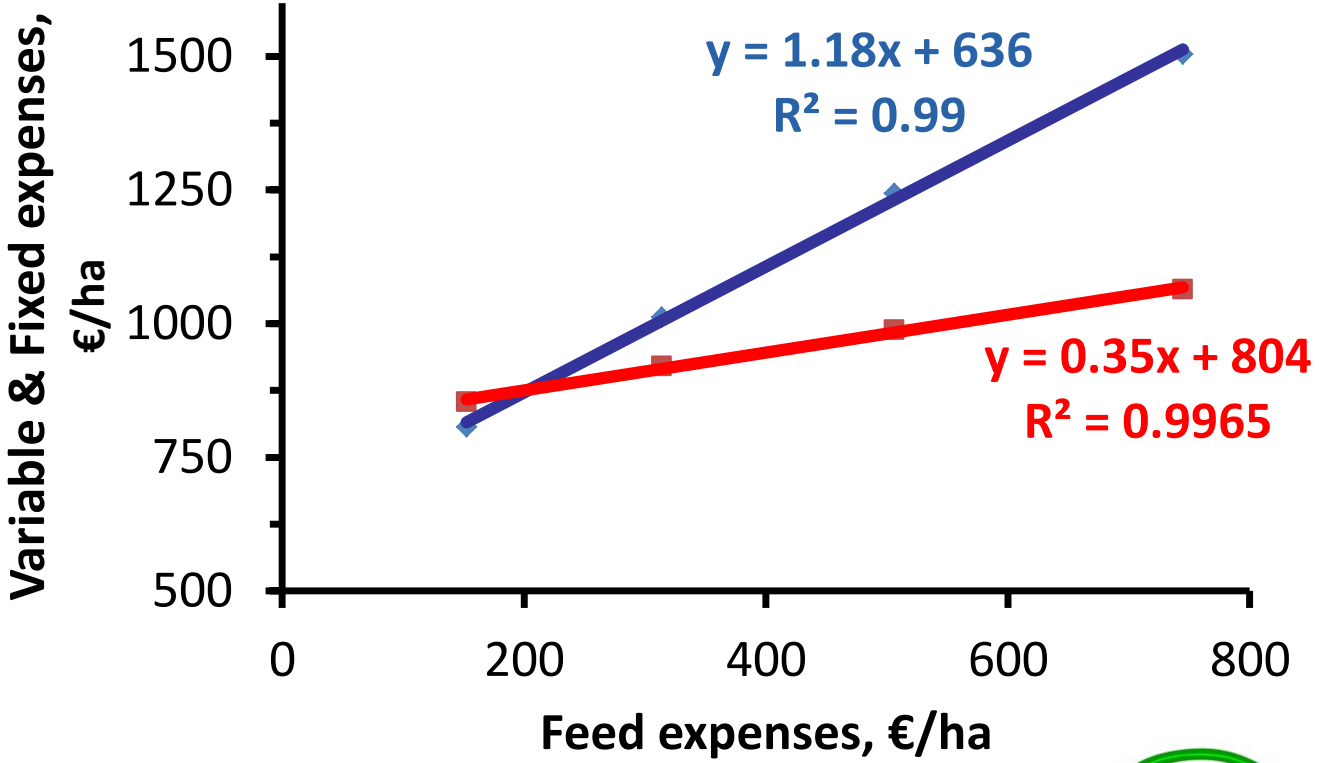
Marginal milk, $/kg MS	*		**7.97**	**7.81**

costs of feeding



Source: Ramsbottom et al. 2015 Journal of Dairy Science.

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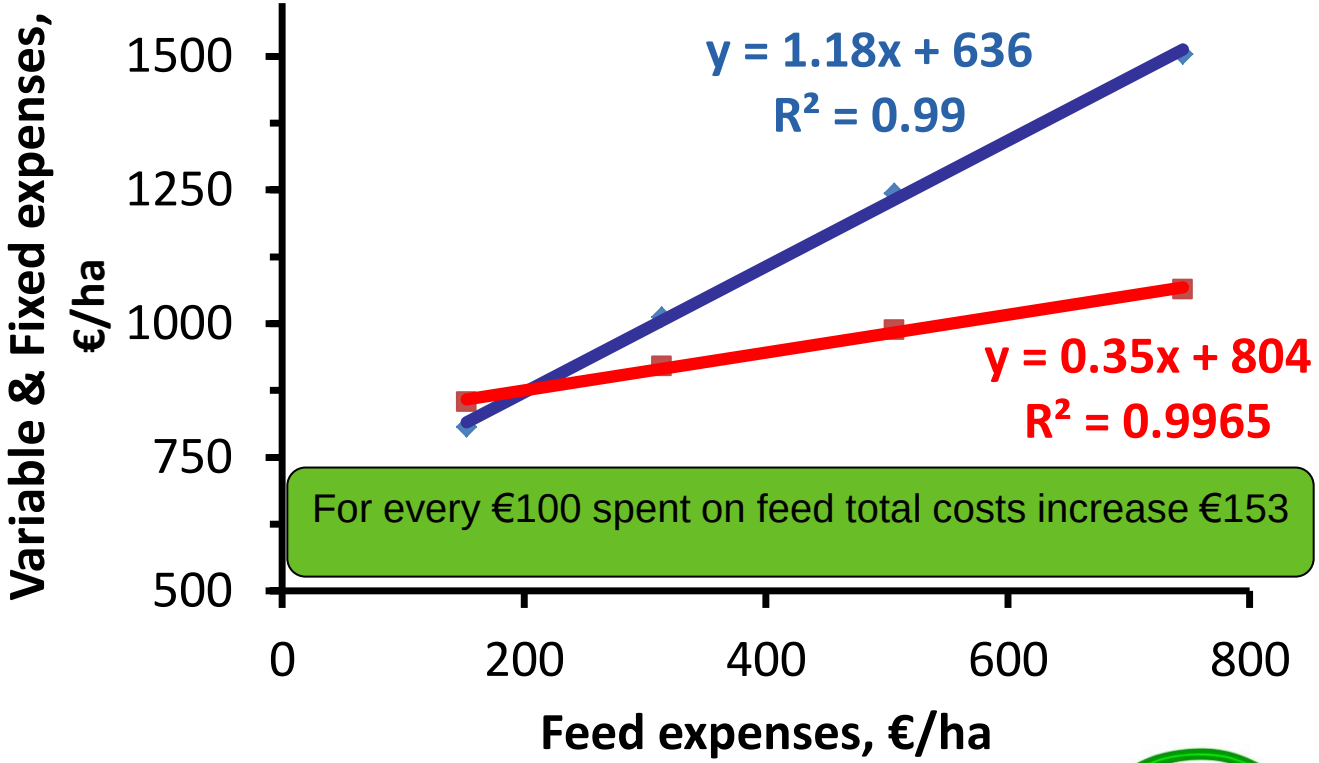

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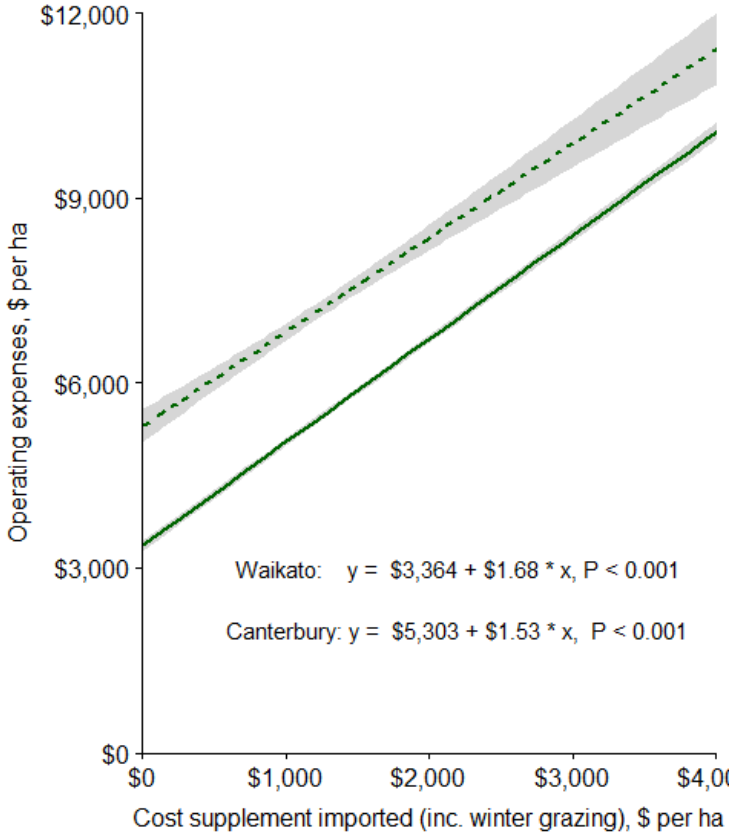
Hidden costs?

- Waikato: $1.68
- Canterbury: $1.53
- Ireland: €1.53
- UK: £1.62



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Why farmers feed supplements?

Surveyed farmers in Ireland and New Zealand

Many reasons, but grouped into:

1. *Prevent BCS loss in early lactation (repro);*

4. *Increase MS production to increase profit.*

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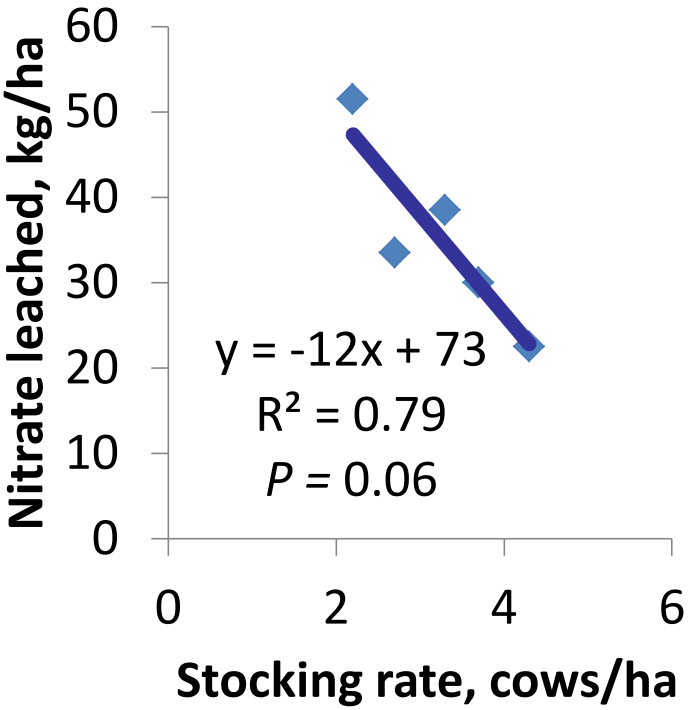
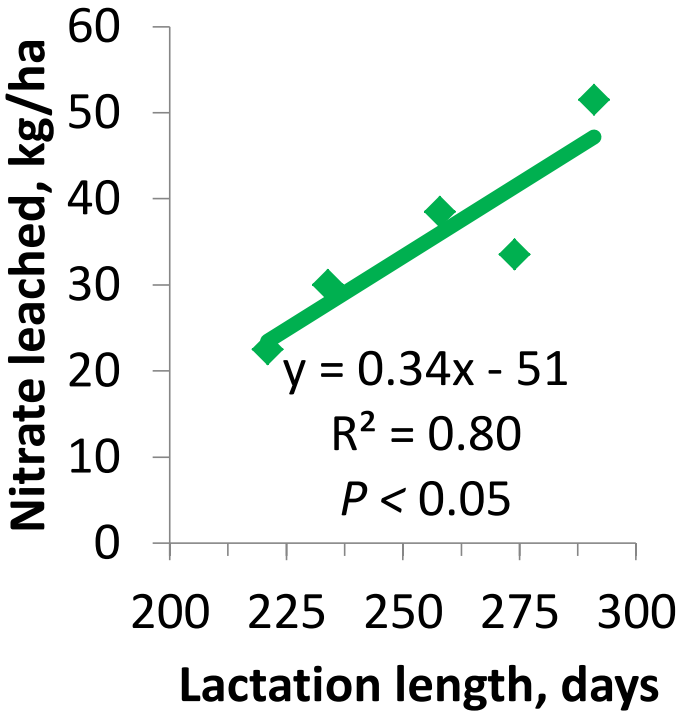
One final cost!

Two environmental concerns:

- Nitrate leaching
- Carbon footprint

Increasing stocking rate actually reduces NO_3 leaching

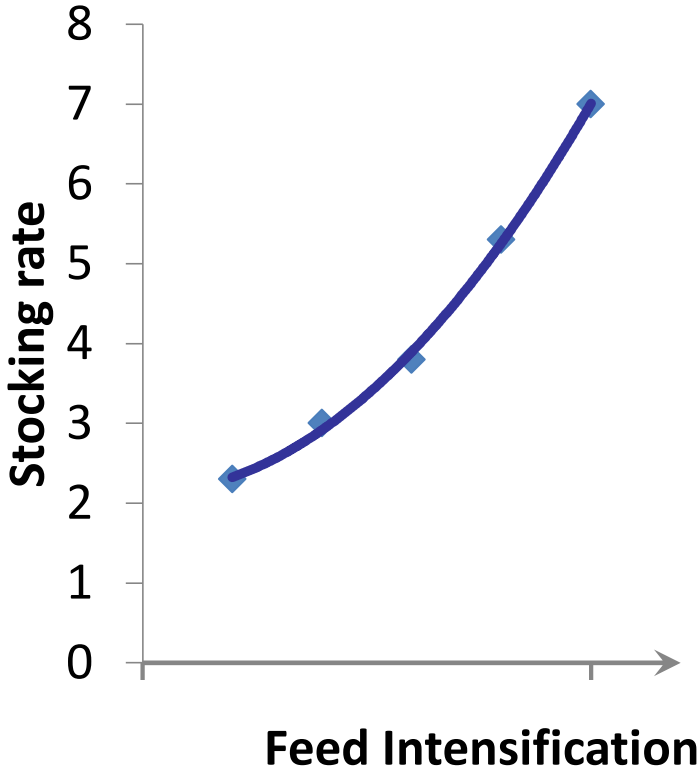


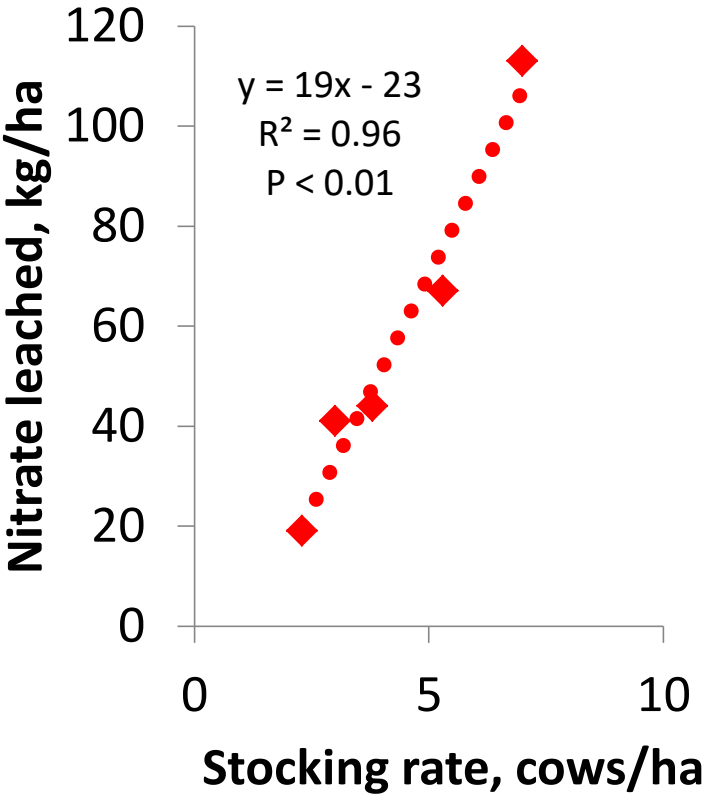


For every extra cow/ha in a 'closed' system, NO_3 leaching declines 12 kg/ha

Reducing lactation length reduces NO_3 leaching by 9 kg/ha for each month less in milk

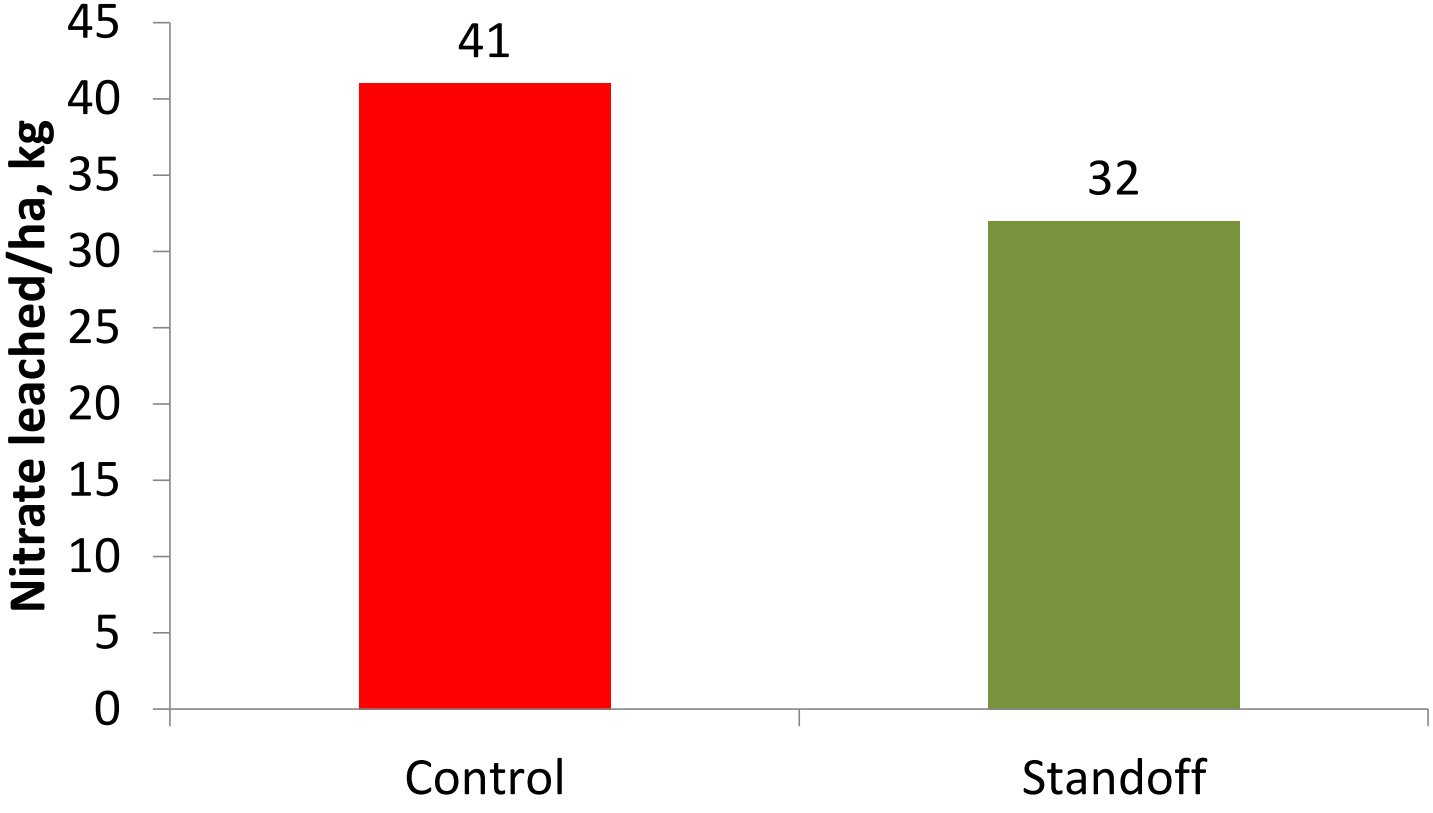
Intensification with a cost





Increasing stocking rate through purchased feeds increases NO_3 leaching by 15-20 kg/ha per extra cow

Invest in depreciating assets to reduce nitrate leaching



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Cost of milk, $/kg MS		-	6.33	5.54
Cost of milk, $/kg MS	-		7.97	8.81
Carbon Footprint, t CO_2eq	87.5	95.0	128.0	113.0

Summary


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Summary

Supplements can:

- increase MS prodn/ha and per cow;
- extend lactation length;
- increase BCS in late lactation/dry period;

Supplements do not:

- Prevent BCS loss in early lactation;
- Improve reproduction;
- Reduce workload on farm;
- Improve farm profitability!

Thank you

Contact me:

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@down2earth_john

"***Rest satisfied with doing well, and leave others to talk of you as they please***" — Pythagoras